CLAIMS

What is claimed is:

1. A method for detecting *Listeria spp.* in a sample, the method comprising:

(a) providing an inert surface having adhered thereto anti-Listeria antibodies capable of capturing *Listeria spp.* cells;

(b) contacting the surface of step (a) with a sample suspected of containing *Listeria spp.*, wherein *Listeria spp.* cells present in the sample adhere to the anti-Listeria antibodies on the surface;

(c) contacting the surface of step (b) with a substrate for beta-glucosidase that produces luminescence when hydrolyzed, wherein beta-glucosidase produced by the *Listeria spp.* cells adhered to the anti-Listeria antibodies catalyzes hydrolysis of the substrate; and

(d) contacting the surface of step (c) with an enhancer molecule, and then

(e) detecting the luminescence generated in step (c), wherein the luminescence is indicative of the presence of the *Listeria spp.* cells in the sample.

2. The method of Claim 1, wherein in step (a), the inert surface is a particle.

3. The method of Claim 1, wherein in step (a), the inert surface is a magnetic particle.

4. The method of Claim 1, wherein in step (a), the inert surface is a silica-coated particle.

5. The method of Claim 1, wherein in step (a), the inert surface is a dextran-coated particle.

6. The method of Claim 1, wherein in step (a), the inert surface is a silica- and dextran-coated particle.

7. The method of Claim 1, wherein in step (a), the inert surface has adhered thereto anti-Listeria IgG.

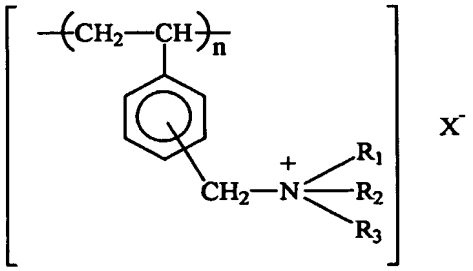
8. The method of Claim 1, wherein in step (c), the substrate for beta-glucosidase comprises a 1,2-dioxetane.

9. The method of Claim 8, wherein in step (c), the substrate for beta-glucosidase comprises a compound selected from the group consisting of {(4-(2-phenoxyethoxy)-4-(3-phosphoryloxy-4-chlorophenyl)} spiro {1,2-dioxetane-3,13'-tricyclo{7.3.1.$0^{2,7}$}tridec-2,7-ene} and salts thereof.

10. The method of Claim 1, wherein in step (d), the enhancer molecule comprises a co-polymer of styrene and a polymerizable quaternary ammonium monomer.

11. The method of Claim 1, wherein in step (d), the enhancer molecule comprises a poly(vinylbenzyl) ammonium polymer having an weight average molecular weight (M_w) of from about 50,000 to 70,000 Da.

12. The method of Claim 1, wherein in step (d), the enhancer molecule is selected from the group consisting of compounds of Formula I and Formula II:
Formula I:



Formula I

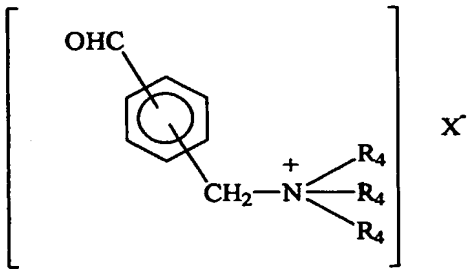
wherein each of R_1, R_2 and R_3 can be a straight or branched chain unsubstituted alkyl group having from 1 to 20 carbon atoms, a straight or branched chain alkyl group having from 1 to 20 carbon atoms substituted with one or more hydroxy, alkoxy, aryloxy, amino, substituted amino, amido, fluoroalkane, or fluoroaryl groups; an unsubstituted monocycloalkyl group having from 3 to 12 ring

carbon atoms, a substituted monocycloalkyl group having from 3 to 12 ring carbon atoms substituted with one or more alkyl, alkoxy or fused benzo groups; a polycycloalkyl group having 2 or more fused rings, each having from 5 to 12 carbon atoms unsubstituted or substituted with one or more alkyl, alkoxy or aryl groups; an aryl, alkaryl or aralkyl group having at least one ring and from 6 to 20 carbon atoms in toto, unsubstituted or substituted with one or more alkyl, aryl, or fluoroalkane or fluoroaryl groups;

X- is a counterion; and

"n" is a positive integer such that the molecular weight of the Formula I compound will range from about 800 to about 200,000 Da; and

water-soluble acetals of a polyvinylalcohol and a formylbenzyl quaternary ammonium salt as shown in Formula II:



Formula II

wherein each R_4 is the same or a different aliphatic substituent and X- is an anion.

13. The method according to any one of Claims 1 to 12, further comprising, prior to step (c) aging the substrate at room temperature in the presence of proteins for a period of at least 12 hours.

14. The method according to Claim 13, comprising aging the substrate at room temperature for a period of at least 24 hours.

15. The method according to Claim 13, comprising aging the substrate at room temperature for a period of at least 48 hours.

16. The method according to Claim 13, comprising aging the substrate in the presence of heat-denatured proteins.

17. The method according to any one of Claims 1 to 12, further comprising, after step (b) and prior to step (c), separating the surface from the sample.

18. A kit for detecting *Listeria spp.* in a sample, the kit comprising:

an inert surface having adhered thereto anti-Listeria antibodies capable of capturing *Listeria spp.* cells;

a substrate for beta-glucosidase that produces luminescence when hydrolyzed, wherein the substrate is disposed in a first container;

an enhancer molecule disposed in a second container; and

instructions for use of the kit.

19. The kit of Claim 18, wherein the inert surface is a particle.

20. The kit of Claim 18, wherein the inert surface is a magnetic particle.

21. The kit of Claim 18, wherein the inert surface is a silica-coated particle.

22. The kit of Claim 18, wherein the inert surface is a dextran-coated particle.

23. The kit of Claim 18, wherein the inert surface is a silica- and dextran-coated particle.

24. The kit of Claim 18, wherein the inert surface has adhered thereto anti-Listeria IgG.

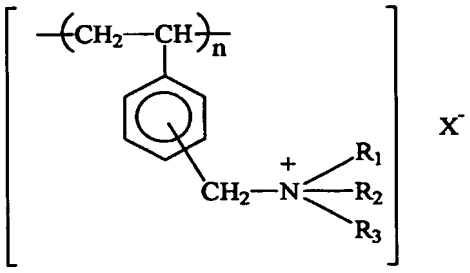
25. The kit of Claim 18, wherein the substrate for beta-glucosidase comprises a 1,2-dioxetane.

26. The kit of Claim 18, wherein the substrate for beta-glucosidase comprises a compound selected from the group consisting of {(4-(2-phenoxyethoxy)-4-(3-phosphoryloxy-4-chlorophenyl)} spiro {1,2-dioxetane-3,13'-tricyclo{7.3.1.$0^{2,7}$}tridec-2,7-ene} and salts thereof.

27. The kit of Claim 18, the enhancer molecule comprises a co-polymer of styrene and a polymerizable quaternary ammonium monomer.

28. The kit of Claim 18, wherein the enhancer molecule comprises a poly(vinylbenzyl) ammonium polymer having an weight average molecular weight (M_w) of from about 50,000 to 70,000 Da.

29. The kit of Claim 18, wherein the enhancer molecule is selected from the group consisting of compounds of Formula I:



Formula I

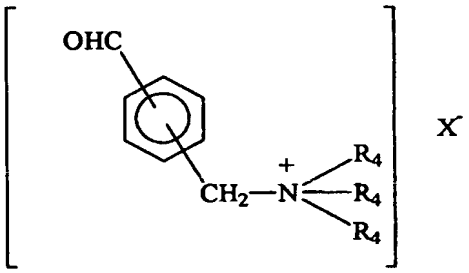
wherein each of R_1, R_2 and R_3 can be a straight or branched chain unsubstituted alkyl group having from 1 to 20 carbon atoms, a straight or branched chain alkyl group having from 1 to 20 carbon atoms substituted with one or more hydroxy, alkoxy, aryloxy, amino, substituted amino, amido, fluoroalkane, or fluoroaryl groups; an unsubstituted monocycloalkyl group having from 3 to 12 ring carbon atoms, a substituted monocycloalkyl group having from 3 to 12 ring carbon atoms substituted with one or more alkyl, alkoxy or fused benzo groups; a polycycloalkyl group having 2 or more fused rings, each having from 5 to 12 carbon atoms unsubstituted or substituted with one or more alkyl, alkoxy or aryl groups; an aryl, alkaryl or aralkyl group having at least one ring and from 6 to 20 carbon atoms

in toto, unsubstituted or substituted with one or more alkyl, aryl, or fluoroalkane or fluoroaryl groups;

X- is a counterion; and

"n" is a positive integer such that the molecular weight of the Formula I compound will range from about 800 to about 200,000 Da; and

water-soluble acetals of a polyvinylalcohol and a formylbenzyl quaternary ammonium salt as shown in Formula II:



Formula II

wherein each R_4 is the same or a different aliphatic substituent and X- is an anion.